CLAIMS:

1. Apparatus for checking the diameter of crankpins (18) rotating with an orbital motion about a geometrical axis (8), in the course of the machining in a numerical control grinding machine including a worktable (23), defining said geometrical axis, and a grinding-wheel slide (1), movable in a transversal direction, with a reference device (20) for cooperating with the crankpin to be checked, a measuring device (16, 17, 40-45) movable with the reference device, and a support device for supporting the reference device and the measuring device, the support device having a support element (5), a first coupling element (9) coupled to the support element so as to rotate about a first axis of rotation (7) parallel to said geometrical axis (8), and a second coupling element (12) carrying the reference device (20) and coupled, in a movable way, to the first coupling element (9), characterized in that the second coupling element (12) is coupled to the first coupling element (9) in such a way as to rotate with respect to it about a second axis of rotation (11) parallel to said geometrical axis (8), the support element (5) is fixed to the grinding-wheel slide (1), and the apparatus comprises a guide device (21) associated with the reference device (20) for guiding the arrangement of the reference device on the crankpin (18) in the course of said orbital motion, and a control device (28-30) for enabling the apparatus to displace in an automatic way from a rest position to a checking condition, and vice versa.

2. An apparatus according to claim 1, wherein, in said rest position, the reference device (20) is arranged substantially above said geometrical axis (8) and, in the displacement from the rest position to the checking condition, describes a trajectory (25) with a prevailing vertical component.

3. An apparatus according to claim 1 or claim 2, wherein said first axis of rotation (7) of the first coupling element (9) substantially lies in a vertical plane wherein the axis of rotation (3) of the grinding wheel (4) lies.

4. An apparatus according to claim 3, wherein said first axis of rotation (7) of the first coupling element (9) lies above the axis of rotation (3) of the grinding wheel (4) and below the upper periphery of the grinding wheel.

5. An apparatus according to one of claims 1 to 4, wherein said guide device (21) has a shaped guiding surface for guiding the reference device (20) to engage the crankpin to be checked (18) in the course of the displacement towards said checking condition and for maintaining contact with the crankpin while the reference device displaces towards said rest position, for limiting the rotation of the first (9) and of the second (12) coupling elements about said first axis of rotation (7) and second axis of rotation (11).

6. An apparatus according to claim 5, wherein said guide device (21) is made by a bent metal rod (22).

7. An apparatus according to one of claims 1 to 6, wherein said reference device (20) is substantially of a Vee-shaped type.

8. An apparatus according to claim 7, wherein said reference device (20) is adjustable with respect to the second coupling element (12) in the direction of the bisecting line of said Vee.

9. An apparatus according to one of claims 5 to 6 and one of claims 7 and 8, wherein said reference device (20) and guide device (21) can be replaced in order to allow variations of the measurement range of the diameters of the

crankpins (18).

10. An apparatus according to one of claims 1 to 9, comprising a counterweight (27) coupled to said first coupling element (9), the reference device (20) being adapted for maintaining contact with the crankpin to be checked (18), substantially owing to the forces of gravity.

11. An apparatus according to one of claims 1 to 9, comprising a spring (73) arranged between said support element (5) and said first coupling element (9), the reference device (20) being adapted for maintaining contact with the crankpin to be checked (18), substantially owing to the forces of gravity.

12. An apparatus according to claim 12, wherein said spring (73) is arranged between said support element (5) and said first coupling element (9) to apply to the reference device (20) a pulling action tending to release said contact with the crankpin to be checked (18).

13. An apparatus according to claim 12, wherein said spring is a return spring (73).

14. An apparatus according to one of claims 10 to 13, comprising an abutment (27;72) connected to the first coupling element (9), wherein said control device comprises a movable element (29, 30) for cooperating with said abutment (27:72) for bringing and keeping the apparatus in the rest position.

15. An apparatus according to claim 14, wherein said control device comprises a double-acting cylinder (28).

16. An apparatus according to one of claims 1 to 15, comprising a detecting device (60) for detecting the presence of the workpiece to be checked (34) in the

checking position, the control device (28-30) being controlled by the detecting device for preventing, in the absence of a workpiece, the displacement of the apparatus from the rest position.

17. An apparatus according to claim 8, wherein in said rest position the bisecting line of said Vee is substantially arranged in a vertical position.

18. An apparatus according to one of claims 1 to 17, wherein the coupling between the second coupling element (12) and the first coupling element (9) comprises a limiting element (32) for limiting the rotational displacements of the second coupling element with respect to the first coupling element.

19. An apparatus according to one of claims 1 to 18, wherein at least one of said first (9) and second (12) coupling elements comprises substantially linear offset portions (36, 37), for avoiding interference with elements of the grinding machine.

20. An apparatus according to one of claims 1 to 19, wherein said measuring device (16, 17, 40-45) comprises a guide casing (15) fixed to the second coupling element (12), a transmission rod (16) axially movable within the guide casing, a feeler (17) eccentrically fixed to an end of said transmission rod for contacting the crankpin (18), a measurement transducer (41) fixed to the guide casing and provided with a movable element (42) cooperating with the other end of the transmission rod, and a device (46) for preventing rotational displacements of the transmission rod with respect to the guide casing.

21. An apparatus according to claim 20, wherein said device for preventing rotational displacements of the transmission rod (16) with respect to the guide casing (15)

comprises a metal bellows (46) having its ends fixed to the transmission rod and to the guide casing, respectively.

22. An apparatus according to claim 20 or claim 21, comprising two bushings (44, 45) arranged between the guide casing (15) and the transmission rod (16), for centering and guiding the transmission rod with respect to the guide casing.

23. An apparatus according to one of claims 20 to 22, wherein said reference device (20) is fixed in a dismantable way to said guide casing (15).

24. An apparatus according to one of the claims 20 to 23, wherein said second coupling element comprises said guide casing (15) and an arm (12), substantially perpendicular to the guide casing, coupled in a rotating way to the first coupling element (9).